

Pteridophytic Composition in Banajalaya Forest Region, Karnataka, South India

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Abstract: Nineteen species of pteridophytes belonging to 16 genera of 11 families were documented with their diversity index in Banajalaya forest region of Shimoga district. *Athyrium hohenackeranum* (Kunze) T.Moore is the most abundant species with highest important value index and density. The Shannon's and Simpson's diversity values for pteridophytic species in Banajalaya forest region indicated that high species richness.

Keywords: Pteridophytes, Banajalaya forest, Diversity index

1. Introduction

Pteridophytes are the most primitive vascular plants, which originated in the Silurian period 438 million years ago constitute a significant part of the vegetation next only to the angiosperms. Pteridophyta (Pteron- feather, Phyton-plants), also known as vascular 'Cryptogams'. They flourished well during Devonian Mississippian and Pennsylvanian periods of the late Paleozoic can easily be regarded as the "Age of Pteridophyta". Only the present day ferns have somehow managed to conserve the former stature, diversity and glory of their ancestors. *Psilotum* and *Tmesipteris* are two surviving remnants of psilopsids retain the primitive features of the first land plants. In the present day flora, excluding the non-vascular plants, they rank only next to the spermatophytes. Usually pteridophytes grow in cool and shady habitat though few are Xerophytic (*S. rupestris*) and many are aquatic (*Marsilia*, *Salvinia*, and *Azolla*). The pteridophyta have a long fossil history. Pteridophytes are represented by about 305 genera and 13,000 species in the world [1][2]. Though they are dominant by spermatophytes in modern day flora, still they attract ones attention due to their beautiful foliage. Identification of rare and endangered plant species is the first requirement for any conservation programme. The IUCN guideline is the only available method to identify the rare and endangered species and it requires vast data on the wild population of the target species [3]. The world conservation monitoring centre at Cambridge, England, listed 1650 threatened species of pteridophytes worldwide, under the following categories; presumed extinct-20, endangered-67, vulnerable-91 and rare-354 [4]. In India, about five hundred species of fern allies have been reported and later Dixit [5] has raised the number to one thousand. In central Western Ghats, Karnataka also the richest floristic area for harbours pteridophytic flora [6][7][8][9][10][11][12].

There is no literature available on pteridophytes in Banajalaya forest region of Sagara taluk, Shimoga district. Hence, present study made attempt on pteridophytic composition in Banajalaya region of Shimoga district, Karnataka. The study area encompasses of 40 acres forest, which harbours 700 plants including herbs, shrubs and

trees. The altitude is 579 meters (1,900 feet) above m.s.l. The study area located in Sagara taluk Shimoga district lies between 14° 16' 67" N latitude and 75° 03' 33" E longitude. The vegetation of study area including semi evergreen and evergreen forest.

2. Materials and Methods

A survey of pteridophytes in study area was conducted during the period 2013-2014. A total of 7 transects each measuring 50×2 were laid down in Banajalaya forest region. Different forms of pteridophytes were recorded i.e, terrestrial, epiphytic, and hydrophytic. In case of epiphytic form present on large tree considered as one colony and hydrophytic form also considered as one. Diagnostic features of all the specimens were studied and relevant field notes were made on fresh plant material. Specimens were identified by referring to available literature and Pteridophytic floras [13] [14] [15] [16] [17] [18]. Authentications of the species were confirmed by Panchvati Research Academy for Nature, Kalamandji, Sagara. For nomenclature, Fraser-Jenkins [19] has been followed.

Data on various pteridophytic species incidence in different transect were collected and analyzed through statistical methods. Density is an expression of the numerical strength of a pteridophytic species where the total number of individuals of each species in all the transects is divided by the total number of transects studied. Frequency refers to the degree of dispersion of individual pteridophytic species in an area and usually expressed in terms of percentage occurrence. It was studied by sampling the study area at several places at random and recorded the name of the species that occurred in each sampling units. Abundance is the study of the number of individuals of different species in the community per unit area. By transects method, samplings are made at random at several places and the number of individuals of each species was summed up for all the transects divided by the total number of transects in which the species occurred. Relative density is the study of numerical strength of a species in relation to the total number of individuals of all the species. The degree of

dispersion of individual species in an area in relation to the number of all the species occurred considered as Relative frequency. Importance Value Index is used to determine the overall importance of each species in the community structure. In calculating this index, the percentage values of the relative frequency, relative density and relative dominance are summed up together and this value is designated as the Importance Value Index or IVI of the species [20][21][22]. Based on the data of the occurrence of the species in the transects by Shannon's diversity index (H^1) was calculated which is represented by formula (H^1) = $-\sum P_i \ln P_i$, where $P_i = (n_i/N)$. Simpson's diversity index was calculated by formula (D) = $\sum [n_i (n_i - 1) / N (N - 1)]$, Where, n_i = Number of individuals of the i^{th} species and N = Total number of individuals.

3. Results and Discussion

A total of 1396 individuals recorded from 7 transect in study area. They are 19 species of 16 genus belongs to 20 families were documented with their diversity index. The diversity of this region is not only rich in pteridophytes but also rich in angiosperms, lichens and mosses. The pteridophytes occur in various habitats, such as terrestrial, epiphytic, lithophytes and hydrophytes found in this region [23]. The epiphytic species such as *Drynaria quercifolia* (L.) J.Sm. (Fig. 2A) and *Microsorium zippelii* (Blume) Ching (Fig.E&F) and only one aquatic fern as *Ceratopteris thalictroides* (L.) Brongn. were documented in study area.

Athyrium hohenackeranum (Kunze) T.Moore (79.57) densely populated in study area followed by *Selaginella delicatula* (Desv.ex Poir) Alston (52.57), *Pityrogramma calomelanos* (L.) Link (17.42), and *Selaginella tenera* (Hook. & Grev.) Spring (13) while lowest for *Angiopteris helferiana* C.Presl (0.14), *M. zippelii* (0.28) and *Cyathea gigantea* (Wall. ex Hook.) Holttum (0.42) (Fig.1). *Athyrium hohenackeranum* (79.6) has much abundance followed by *S. delicatula* (61.33), *P. calomelanos* (61), *Lycopodiella cernua* (L.) Pic.Serm (28) while *A. helferiana* and *M. zippelii* (1) were recorded as of less abundance.

The maximum frequency found in *A. hohenackeranum* followed by *Adiantum philippense* L. and *S. delicatula* (0.85), *Adiantum concinnum* Humb. & Bonpl. ex Willd and *S. tenera* (0.71), *Lindsaea heterophylla* Dryand and *Adiantum capillus-veneris* L. (0.42), while *A. helferiana*, *Blechnum orientale* L., *C. thalictroides*, *C. gigantea*, *L. cernua*, *Lygodium flexuosum* (L.) Sw., *Pteris pellucida* C.Presl (Fig.2B), *Tectaria coadunata* Ching and *Thelypteris dentata* (Forsk.) E.P.St.John (0.14) were occurred as of low frequency.

Athyrium hohenackeranum was reported by 557 individuals with higher importance value Index (IVI) of (77.9) and followed by *S. delicatula* (Desv.ex Poir) Alston (56.86), *P. calomelanos* (31.14) and *A. helferiana* showed less (2.37) respectively. *Athyrium hohenackeranum* was found to be dominant in the Banajalaya forest region. The Shannon's diversity value (H^1) 1.79 and Simpson's diversity (D) 0.247 value for pteridophytic species in Banajalaya forest showed high species richness. The

present study highlighting the pteridophytic species richness in Banajalaya forest region. In this context, present investigation would serve as a baseline data for effective conservation programmes.

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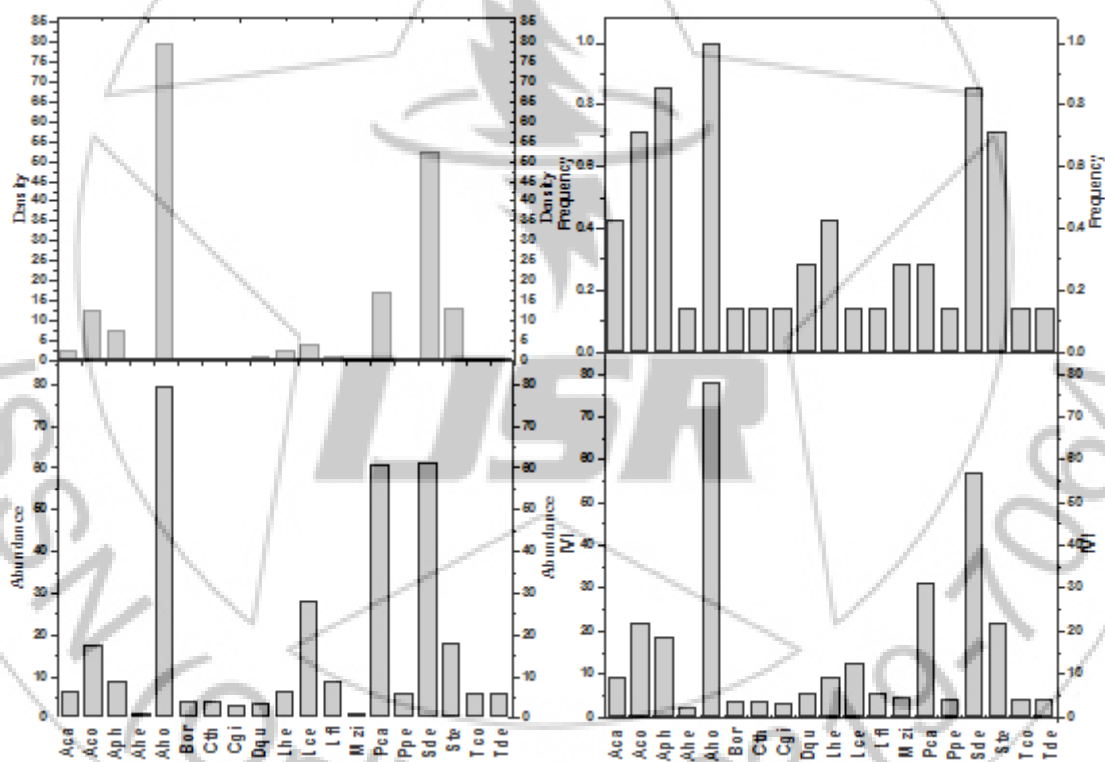


Figure 1: Pteridophytes composition in Banajalaya forest region of Shimoga district, Karnataka

Note: **Aca:** *Adiantum capillus veneris* L; **Aco:** *Adiantum concinnum* Humb. & Bonpl. ex Willd; **Aph:** *Adiantum philippense* L.; **Ahe:** *Angiopteris helferiana* C.Presl; **Aho:** *Athyrium hohenackeranum* (Kunze) T.Moore; **Bor:** *Blechnum orientale* L.; **Cth:** *Ceratopteris thalictroides* (L.) Brongn.; **Cgi:** *Cyathea gigantea* (Wall. ex Hook.) Holttum; **Dqu:** *Drynaria quercifolia* (L.) J.Sm.; **Lhe:** *Lindsaea heterophylla* Dryand.; **Lce:** *Lycopodiella cernua*

(L.) Pic.Serm.; **Lfl:** *Lygodium flexuosum* (L.) Sw.; **Mzi:** *Microsorium zippelii* (Blume) Ching; **Pca:** *Pityrogramma calomelanos* (L.) Link.; **Ppe:** *Pteris pellucida* C.Presl; **Sde:** *Selaginella delicatula* (Desv.ex Poir) Alston; **Ste:** *Selaginella tenera* (Hook. & Grev.) Spring; **Tco:** *Tecteria coadunata* Ching; **Tde:** *Thelypteris dentata* (Forsk.) E.P.St.John; **IVI:** Importance Value Index

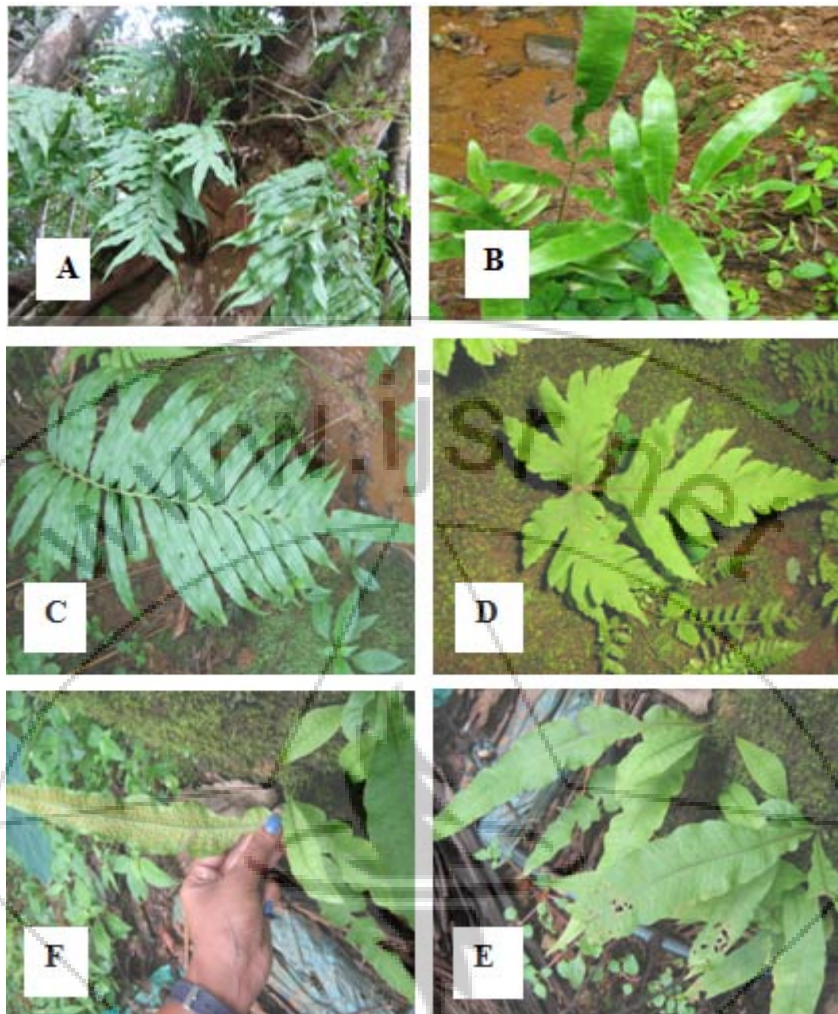


Figure 2: A. *Drynaria quercifolia* (L.) J.Sm. ; B. *Pteris pellucida* C.Presl ; C. *Blechnum orientale* L ; D. *Tectaria coadunata* Ching; E & F; *Microsorium zippelii* (Blume) Ching;

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